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EFFECT OF SOWING DATE ON PERFORMANCES OF MUNGBEAN AT BARI RESEARCH FIELD IN DINAJPUR

M. M. Khanum*, M. M. Bazzaz[1], M. A. Hossain, M. S. Huda and M. Nuruzzaman
Agricultural Research Station, BARI, Rajbari, Dinajpur-5200
[1]Bangladesh Wheat and Maize Research Institute, Nasipur, Dinajpur-5200
*Corresponding author's e-mail: mahbuba.bari27@gmail.com

ABSTRACT

A field experiment was conducted at the Agricultural Research Station, BARI, Rajbari, Dinajpur during the *kharif-1* season of 2016-17 and 2017-18. The aim of the study was to determine the optimum sowing date for maximizing the yield of mungbean in Dinajpur area of Bangladesh. The test crop for the experiment was BARI Mung-6, which was sown on five different dates viz., 25 February (S_1), 05 March (S_2), 15 March (S_3), 25 March (S_4) and 05 April (S_5). Days to flowering and maturity were different for different sowing times. It was found that sowing performed on 05 March produced the highest seed yield including the highest number of pod length, pods plant^{-1}, seeds pod^{-1} and 1000-seed weight. Mungbean sown after 05 March gradually decreased the seed production and it was sustained upto 05 April. It exposed that sowing should preferably be done around 15 March and sowing is not desirable beyond 25 March at all under agro-climatic conditions of Dinajpur areas of Bangladesh.
Key words: BARI Mung-6, sowing time, growth, yield

Introduction

Mungbean (*Vigna radiata* L.) is one of the important pulse crops, which contains high quality vegetable protein and satisfactory amounts of minerals and vitamins. Due to easy digestibility, better palatability and high market price, mungbean is the first choice to the farmers. The agro-ecological condition of Bangladesh is favorable for growing mungbean in the winter season although it is cultivated in both summer and winter seasons in many countries of the world (Bose, 1982 and BARI, 1998). Recently, farmers are not much interested in growing pulse crops in winter season. Besides these, increasing area under wheat, maize and irrigated boro rice cultivation has further reduced the area under pulses. Therefore, it has become imperative to shift the cultivation of some of the low yielding pulses from winter to summer seasons. The possibility of growing mungbean in the summer season in Bangladesh is tried with some success (FAO, 1984). A good number of high yielding mungbean varieties are available now in Bangladesh but, farmers generally grow the local varieties using almost no fertilizer and they rarely maintain the proper sowing time. Moreover, farmers are losing interest in producing mungbean due to low income per unit of resources invested. Therefore, attention should be given to increasing yield through selection of suitable varieties and adoption of improved cultural practices for establishing mungbean as a profitable crop. For any yield improvement programme selection of superior parents is a prerequisite i.e., possessing better heritability and genetic advance for various traits (Ahmad *et al*., 2008). Sowing time, a non-monetary input, is the single most important factor to obtain optimum yield from mungbean (Samanta *et al*., 1999). So determination of optimum sowing time for mungbean is inevitable. Optimum time of sowing of mungbean may vary from variety to variety and season to season due to variation in agro-ecological conditions. Therefore, there must be a specific sowing dates, especially in the summer season for different varieties to obtain maximum yield. Delayed sowing after March and early sowing before February reduce yield of summer mungbean (Chovatia *et al*., 1993). February may be considered as the optimum time for summer mungbean and late planting after March may subject to rain damage during maturity period (Dharmalingam and Basu, 1993). The present investigation was therefore, undertaken to identify the suitable sowing time of mungbean for the Dinajpur area of Bangladesh.

Materials and Methods

The experiment was conducted at the research field of Agricultural Research Station, Rajbari, Dinajpur during *kharif* season of 2016-17 and 2017-18. The temperature and rainfall status are shown in Fig. 1. The experiment was laid out in randomized complete block (RCB) design with three replications. The unit plot size was 4.0m×3.0m. BARI mung-6 sown at five different dates viz. 25 February (S_1), 05 March (S_2), 15 March (S_3), 25 March (S_4) and 05 April (S_5). The spacing was 30cm×10cm. The land of the experimental plot was prepared with a power tiller by ploughing and cross ploughing followed by laddering and the soil was brought into good tilth. Fertilizers were applied at the rate of 18-30-36-18kg/ha of N-P-K-S as urea, triple super phosphate (TSP), murate of potash (MOP) and gypsum respectively. The experimental plots were fertilized with all the fertilizer at the time of final land preparation. Intercultural operations like watering, weeding and pest control were done as and when required. Yield components of mungbean were taken from randomly selected 10 plants from each plot. Seed yields were taken from whole plot. Collected data were analyzed statistically by using MSTAT software packages and mean differences for each character were compared by Least Significant Differences (LSD) test (Gomez and Gomez. 1984).

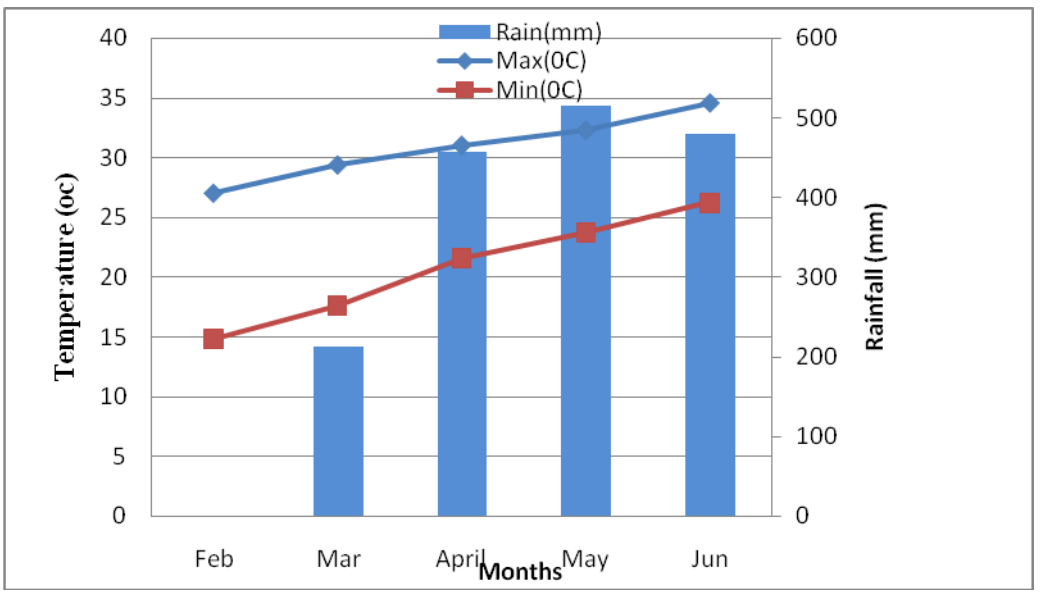

Fig.1. Mean temperature (min & max) and monthly total rainfall during crop growth period

Results and Discussion

Phenological parameters: The days to emergence, days to flowering and days to physiological maturity of mungbean significantly affected by different sowing dates as are presented in (Table 1). Mungbean sown on 25 February required 6 days to emergence, while crop sown on after 15 March to 05 April required only 4 days to emergence. Crop sown on 25 February required 38.4 days to reach first flowering stage, while crop sown on 05 April attained the same stage in 28 days only. Days required for first harvesting also followed the similar trend. The last sown crop took only 58.1 days to allow first harvesting, which was mainly due to earliest flowering. On the other hand, the crop sown earliest required more than 67 days for first harvesting this might be due to delayed flowering. Poehlman (1991) stated that abundant rainfall, short photoperiod and high mean temperature resulted in early maturity of mungbean. Shorter growth of those sowing might be due to high mean temperature and excessive rainfall (Table 1). Crops sown on 25 February sowing required longer duration (67.9 days) for maturity which might have occurred due to deficit of soil moisture content, received from no rainfall (Table 1) especially at the early growing period of crops that delayed plant establishment and maturity.

Table1. Effect of seed sowing time on phenological parameters of mungbean

Treatments	Days to emergence	Days to flowering	Days to maturity
25 February (S_1)	6	38.4	67.9
05 March (S_2)	5	35.4	65.5
15 March (S_3)	4	32.5	62.5
25 March (S_4)	4	30.2	60.5
05 April (S_5)	4	28.4	58.1
LSD(0.05)	0.29	1.63	3.07
CV (%)	3.35	2.58	2.58

Yield attributes: The yield and yield attributes of mungbean on five sowing dates are presented in Table 2. Different dates of sowing had significant effect on plant height, branch plant^{-1}, pod length, pods plant^{-1}, seeds pod^{-1} and 1000-seed weight, seed and stover yield. Plant height increased gradually with delay in sowing due to increased temperature as reported by Poehlman (1993). The highest (71.22 cm) plant height was found on 05 April sowing date and the lowest (44.5cm) was found on 25 February sowing date. Number of branches plant^{-1} was significantly affected by sowing dates. Earlier sown (25 February and 05 March) crops produced higher number of branches plant^{-1} (4.84 and 3.29) as compared to later sown crops. The highest number of pods plant^{-1} (23.82) was found on 05 March sowing followed by 15 and 25 March sowing, respectively. Pod length and number of seeds pod^{-1} of earlier sown crops were higher than that of later sown crops. The highest (8.82 cm) and the lowest (6.77 cm) pod length were found on 05 March and 05 April sowing, respectively. Higher number of seeds pod^{-1} was found on 05 March (11.55) and 15 March (10.95) sowing which were statistically similar and the lowest (8.5) was found on 05 April sowing. The highest 1000-seed weight (43.27 g) was found on 05 March sowing followed by 15 March (40.3 g), 25 March (35.22 g) and 05 April (17.95 g) sowing might be due to higher accumulation occurred in the growth period of earlier sowing.

Table 2: Effect of seed sowing time on yield contributing attributes of mungbean (Pooled data of 2 years)

Treatments	Plant height (cm)	Branch/ plant (no.)	Pod length (cm)	Pod/plant (no.)	Seeds/pod (no.)	1000-seed weight (g)
25 February (S_1)	44.5	4.84	7.81	17.55	10.4	39.8
05 March (S_2)	57.00	3.29	8.82	23.82	11.55	43.27
15 March (S_3)	58.5	2.75	6.92	21.94	10.95	40.3
25 March (S_4)	67.49	2.73	6.77	19.74	9.65	35.22
05 April (S_5)	71.22	1.23	6.29	15.94	8.5	17.95
LSD(0.05)	10.16	1.09	1.39	3.37	1.90	4.04
CV (%)	9.14	19.74	12.67	9.00	9.74	6.16

Seed yield: Seed yield of mungbean was significantly influenced by sowing date (Table 3). Results revealed that 05 March sowing produced the highest seed yield, which resulted from the highest number of pods plant^{-1} and seeds pod^{-1}. Sowing after 05 March gradually decreased the seed production and 05 April sowing produced the lowest yield. Soomro (2003) reported that delay in sowing causes a substantial decrease in all the growth and development parameters of mungbean. The highest seed yield obtained from 05 March sowing might be due to suitable temperature prevailing accompanied by higher soil moisture content due to sufficient rainfall in April, which enhanced the vegetative as well as reproductive growth of the crop. This findings closely resembles to those reported by Sinha *et al*. (1989) and Poehlman (1991) who opined that mungbean being a warm season plant produces higher yield at the optimum mean temperature range of 25-30^{0}C. Sowing in the month of April (05 April) resulted in lower yield than other sowing dates, which was the consequence of high insect (flower & pod borer) infestation occurred due to high air temperature (above 30^{0}C) and excessive rainfall during pod filling stage in the month of June.

Pohelma (1991) also concluded that high air temperature accompanied by heavy rainfall caused flower shedding and pod damage, which resulted in reduced seed yield. Sowing on 05 April (last sowing date) produced the highest stover yield, which was closely followed by 25 March sowing. The lowest stover yield on the other hand, was observed in 05 March sowing, which might be due to elevated ambient temperature and higher cumulative rainfall that enhanced vegetative growth of the crop resulting in larger canopy but few pods.

Table 3. Effect of seed sowing time on seed yield of mungbean

Treatment	Seed yield (t/ha)	Stover yield (t/ha)
25 February (S_1)	1.42	1.79
05 March (S_2)	1.62	2.15
15 March (S_3)	1.48	2.74
25 March (S_4)	0.99	2.79
05 April (S_5)	0.53	2.94
LSD(0.05)	66.68	266.065
CV (%)	5.13	5.82

Conclusion

From the present study it may be concluded that 05 March to 15 March sowing dates were more suitable for the cultivation of BARIMung-6 at a planting density of 30x10cm under agro-climatic conditions of Dinajpur for obtaining maximum yield because there was drastic reduction in yield after this date.

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